

WHAT IS CLAIMED IS:

1. A semiconductor device with an MOS transistor, where the gate electrode of the MOS transistor is in a stacked structure comprising a silicon layer, a metal silicide layer, a reaction barrier layer and a metallic layer formed in this order from the bottom upwards.
2. A semiconductor device according to Claim 1, wherein the silicon layer is doped with an impurity of any desired conductor type.
3. A semiconductor device according to Claim 1, wherein the metal silicide layer has a thickness of 5-20 nm.
4. A semiconductor device according to Claim 1, wherein the metal silicide layer is a tungsten silicide layer, the reaction barrier layer is a tungsten nitride layer, and the metallic layer is a tungsten layer.
5. A semiconductor device with an MOS transistor whose gate electrode is in a stacked structure comprising a silicon layer and a metallic layer as an uppermost layer provided on the silicon layer, wherein a metal silicide layer is provided on the silicon layer side and a reaction barrier layer is provided under the metallic layer side between the silicon layer and the metallic layer.
6. A semiconductor device according to Claim 5, wherein the silicon layer is doped with an impurity of any desired conduction type.

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7. A semiconductor device according to Claim 5, wherein the metal silicide layer has a thickness of 5-20 nm.

8. A semiconductor device according to Claim 5, wherein the metal silicide layer is a tungsten silicide layer, the reaction barrier layer is a tungsten nitride layer and the metallic layer is a tungsten layer.

9. Process for producing a semiconductor device, which comprises a first step of forming a first insulation layer on the surface of a semiconductor substrate, a second step of depositing a silicon layer on the first insulation layer, a third step of depositing a first material layer on the silicon layer, a fourth step of depositing a reaction barrier layer on the first metallic layer, a fifth step of depositing a second metallic layer on the reaction barrier layer, a sixth step of processing a stacked structure of the silicon layer, the first metallic layer, the reaction barrier layer and the second metallic layer into a gate electrode form, a seventh step of ion implanting an impurity onto the surface of the semiconductor substrate, using the gate electrode as a mask, and an eighth step of reacting the first metallic layer with the silicon layer by heat treatment, thereby forming a metal silicide layer.

10. A process according to Claim 9, wherein in the eighth step the heat treatment is carried out at 650°C or higher.

11. A process according to Claim 9, wherein the metal silicide layer is a tungsten silicide layer, the reaction barrier layer is a tungsten silicide layer, and the first and second metallic layers are tungsten layers.

12. A process for producing a semiconductor device, which comprises a first step of forming a first insulation layer on the surface of a semiconductor substrate, a second step of depositing a silicon layer on the first insulation layer, a third step of depositing a first metallic layer on the silicon layer, a fourth step of depositing a reaction barrier layer on the first metallic layer, a fifth step of depositing a second metallic layer on the reaction barrier layer, a sixth step of reacting the first metallic layer with the silicon layer by heat treatment, thereby forming a metal silicide layer, a seventh step of processing the stacked structure comprising the silicon layer, the metal silicide layer, the reaction barrier layer and the second metallic layer into a gate electrode form, and an eighth step of ion implanting an impurity onto the surface of the semiconductor substrate, using the gate electrode as a mask.

13. A process according to Claim 12, wherein in the sixth step the heat treatment is carried out at 650°C or higher.

14. A process according to Claim 12, wherein the metal silicide layer is a tungsten silicide layer, the

reaction barrier layer is a tungsten nitride layer and the first and second metallic layers are tungsten layers.

15. A process for producing a semiconductor device, which comprises a step of forming a first insulation layer on the surface of a semiconductor substrate, a step of depositing a silicon layer on the first insulation layer, a step of depositing a metal silicide layer on the silicon layer, a step of depositing a reaction barrier layer on the metal silicide layer, a step of depositing a metallic layer on the reaction barrier layer, a step of processing the stacked structure comprising the silicon layer, the metal silicide layer, the reaction barrier layer and the metallic layer into a gate electrode form, and a step of ion implanting an impurity onto the surface of the semiconductor substrate, using the gate electrode as a mask.

16. A process according to Claim 15, wherein the metal silicide layer is a tungsten silicide layer, the reaction barrier layer is a tungsten nitride layer and the metallic layer is a tungsten layer.

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